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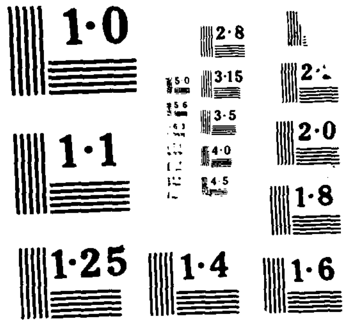
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TACTICAL SURVIVABILITY: THE ENGINEER DILEMMA

by

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This monograph analyzes the capability of U.S. Army combat engineers to provide responsive survivability support to AirLand battle tactical operations. The discussion compares the abilities of the current engineer force with the protection requirements of the maneuver force. This monograph examines survivability concepts and requirements and investigates the best methods for attaining the degree of protection necessary to preserve the combat potential of the fighting force. The discussion considers the theoretical and doctrinal aspects of protection and survivability. The focus of analysis is on the heavy division in middle to high intensity operations. The importance of assessing prudent tactical survivability requirements is supported by a review of unit experiences and lessons learned at the National Training Center. The Soviet Army engineer force and its historically-oriented approach to protection is

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ABSTRACT

TACTICAL SURVIVABILITY: THE ENGINEER DILEMMA, by MAJ Michael T. Wilson, USA, 35 pages.

This monograph analyzes the capability of U.S. Army combat engineers to provide responsive survivability support to AirLand battle tactical operations. The discussion compares the abilities of the current engineer force with the protection requirements of the maneuver force. This issue is important because our AirLand Battle doctrine cannot be executed if our forces do not survive the lethality of the modern battleground. This monograph examines survivability concepts and requirements and investigates the best methods for attaining the degree of protection necessary to preserve the combat potential of the fighting force.

The discussion begins with a consideration of the theoretical and doctrinal aspects of protection and survivability. The focus of analysis is on the heavy division in middle to high intensity operations. The importance of assessing prudent tactical survivability requirements is supported by a review of unit experiences and lessons learned at the National Training Center. The Soviet Army engineer force and its historically-oriented approach to protection is contrasted with the American combat engineer experience to illustrate the serious deficiency in survivability capability in our army today.

The monograph concludes with an assessment of the current and future requirements for tactical protection measures and a recommendation on the best courses of action to pursue. The study suggests that to be effective on the AirLand battlefield, defensive survivability measures must support a decisive transition to offensive operations.

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SECTION I: INTRODUCTION

The United States Army faces challenges from a wide variety of threats. Its global missions span the spectrum of conflict from deterring aggression in Latin America to defeating a major invasion of Western Europe by the nations of the Warsaw Pact. An attack upon NATO by the Soviet-bloc armies is the most dangerous threat facing the U.S. Army. The defending forces will be outnumbered and outgunned by a powerful, modern force having a decided quantitative advantage in armored vehicles, tactical aircraft, and all manner of direct and indirect fire weapons. The maneuver elements of our armored and mechanized divisions, which comprise the backbone of our conventional land forces, will have to meet this challenge and defeat this adversary.

The doctrinal basis for dealing with this threat is found in the United States Army's capstone warfighting manual, Field Manual (FM) 100-5, Operations. Winning on the highly lethal AirLand battlefield will be dependent upon the ability to synchronize superior combat power and bring it to bear upon the weaknesses of the enemy at the decisive places and times. This involves the skillful combination of maneuver, firepower, leadership and protection.[1] Maneuver and firepower are the dynamic elements of combat power that will allow U.S. forces to gain the initiative and win on the AirLand battlefield. But these cannot be achieved without affording adequate protection to the fighting elements of the army. The aspect of protection involves the conservation of fighting potential of the force so that it can be applied at the decisive place and time. Protection

also comprises actions to counter the enemy's firepower and maneuver. To this aspect of combat power, engineers have made an important historical contribution. For the future conduct of AirLand battle, the commitment of engineers to preserving the survivability and mobility of the maneuver force is even more vital.

The purpose of this paper is to examine the issue of tactical survivability for the heavy maneuver force in terms of what the combat engineers of the U.S. Army can and should contribute through the construction of protective positions and other defensive measures. The capabilities and tactics of the Communist-bloc threat forces to neutralize or overcome these efforts form the baseline for study. A comparison of these capabilities and those of the U.S. Army enables an assessment of the scope and direction that tactical survivability measures should take and what the best contribution of U.S. Army combat engineers should be.

This paper will examine the doctrinal view of survivability from the perspective of both the United States and Soviet armies. Historical and contemporary examples will help illustrate the discussion. Tactical survivability, as used in this discussion, is defined as the protection of personnel, weapons, and facilities from the effects of enemy weapons and actions. This study is limited to those aspects of tactical survivability for which unique engineer support, equipment or skills are appropriate. It includes the construction of fighting positions, protective shelters and defensive measures which enhance survivability. The focus is upon defensive operations and upon the heavy division. Survivability support to light, airborne and air assault divisions is not addressed. The aspect of

survivability as used in this discussion does not embrace related measures such as armor protection, nuclear and chemical defense, electronic deception and countermeasures, camouflage operations or individual soldier protective skills. All of these means, including additional considerations such as speed, flexibility and agility, contribute to protection but are considered beyond the scope of this discussion.

It is assumed that historical and contemporary Soviet methods for employing close combat and engineer forces will offer useful insights as to the direction that U.S. Army survivability measures should take to counter the Soviet threat. It is also assumed that the experiences of the National Training Center (NTC) will offer an appropriate simulation of the intensity and complexity of AirLand battle. Finally, the most useful scenario in which to examine tactical survivability is that of an active and fluid mid-to-high intensity battlefield in Western Europe that has developed out of and beyond the scope of a General Defense Plan (GDP) defense. From this can be assessed the adequacy of existing survivability doctrine, the capabilities of the engineer force to support it, and the most feasible courses of action to pursue.

SECTION II: THE SURVIVABILITY CHALLENGE

The purpose of defensive operations, according to FM 100-5, is to retain ground, gain time, deny the enemy access to an area, and to damage or defeat attacking forces. A successful defense is one where the effect of both

reactive and offensive elements work together to wrest the initiative from the attacker and allow the defender the ability to counterattack and defeat the enemy.[2] They can only succeed if the integrity and combat power of the defender is preserved and protected. The outnumbered maneuver elements of the U.S. Army cannot maintain their equilibrium and sustain the fight if they are not survivable on the lethal contemporary battlefield. In a desperate battle against the Soviet Army, our forces must protect themselves as never before from their very real capability to acquire, engage, and destroy us on the battlefield.

So what is required to win? It is the ability to protect the cohesion and effectiveness of personnel and weapons systems from the effects of enemy weapons and actions so that they can continue to fight and gain the initiative through offensive action. Survivability on the AirLand battlefield is complementary to mobility. A large portion of the ability of heavy combat forces to survive is based upon their ability to maneuver and strike the enemy with concentrated combat power on the terrain and at the time that is most advantageous. This can be best achieved by limiting personnel and systems losses by reducing their exposure to threat firepower. The value of survivability positions is practically intuitive; their worth has been proven throughout history. However, even the strongest defense will not guarantee victory. The defender must not only resist the momentum and firepower of the attacker, but move against him and unleash his combat power to destroy the enemy and achieve victory.

Combat engineers provide survivability support that is beyond the scope of the maneuver units. Field Manual 5-103, Survivability, provides a

reference point for this support. Engineers can construct fighting positions for major weapons systems and protective positions for critical command and control, logistics and indirect fire weapons elements.[3] With minefields and obstacles in depth, engineers help shape the terrain to the advantage of the maneuver commander. They act as a combat multiplier for his forces. However, engineer resources and time will seldom be sufficient to do all that is required to provide tactical survivability. Competing missions requiring the same engineer troops and equipment must be weighed by the tactical commander for their costs and benefits. What is the best utilization of scarce engineer assets on the AirLand battlefield? What is the best way to protect maneuver forces? Is survivability more important than countermobility or mobility operations? What should the priorities be? Are combat engineers organized and equipped to provide the capability maneuver forces need of them on the AirLand battlefield? These questions are the focus of this paper.

The engineer force has realized for some time that it is deficient in its ability to support the AirLand Battle. Combat engineers have not kept pace with the mobility demands of modern warfare. A disproportionate amount of existing equipment is World War II technology. Recently, a number of new items of engineer equipment have been introduced into units or type classified for future procurement and fielding. The M9 Armored Combat Earthmover (ACE), for example, is intended to replace the road bound and slow D7 bulldozer and provide responsive survivability support to the maneuver force by moving overland with it. Efforts are also being proposed to redesign the force structure of combat engineer units to make them more

capable and responsive to the needs of the tactical commander and the demands of AirLand battle. This effort, known as E-Force, could provide a much needed revitalization. But are new equipment and organizational initiatives enough? Are there other, more cost effective alternatives? A good starting point for this analysis lies in the organization, mission and tactics of the potentially opposing forces themselves. It will be useful to study the Soviet forces and their engineer approach to survivability to gain an understanding of how U.S. Army forces may well be deficient in its capabilities.

SECTION III: THE SOVIET PERSPECTIVE

The Soviet Union has built a large, modern and impressive fighting force with a decidedly offensive orientation. Its armed forces, along with those of its Warsaw Pact surrogates, represent a very dangerous threat to the United States and its allies. Contemporary Soviet tactics are grounded in the experiences and lessons of the Great Patriotic War (World War II), and have as their fundamental principles an emphasis on concentration of mass, mobility and momentum, surprise, security and firepower. A review of their doctrinal literature and their impressions about U.S. Army defensive techniques emphasizes the importance of survivability to the success of our forces. The Soviet use of combat engineers to enhance protection for their own forces is also worth examining.

The Soviets view decisive offensive action as the essential ingredient

of successful combat operations. They intend to concentrate very strong combat power against weak areas of our defense in order to hack a hole through the line and carry the battle to our rear areas. These breakthrough operations are the most important tasks of their armored forces. Mobility and momentum are essential. The U.S. Army represents a formidable obstacle to the successful prosecution of these desires.

A 1986 Soviet report concerning the U.S. Army in combat gave high regard to American defensive operations.[4] Although steeped in the language of the 1970s-vintage Active Defense, the report cautioned that the U.S. Army will transition into a defensive posture to disrupt friendly (that is, Soviet) operations, to concentrate and preserve its forces, and to hold key terrain. The defense will be strong, echeloned in depth, and possess the capability for bold and active maneuver. Mutually supporting battle positions will strengthen the main defensive area.[5] Given time, supporting combat engineers will emplace minefields and prepare vehicle fighting positions and hardened emplacements for the deliberate defense. A strong tank and artillery fight in the covering force area will transition into the fortified main battle area, where an American division will attempt to concentrate several battalion task forces into a narrow sector to destroy major penetrations. Ideally, weapons will be used near their maximum ranges: 3000 meters for TOW ATGMS and 1500 meters for tank main guns.[6]

The Soviets clearly regard the U.S. Army as having a strong defensive capability; nevertheless, they see methods of overpowering it conventionally. Suppression and destruction of our tanks, infantry fighting vehicles (IFVs), and ATGMs are key components of a Soviet tactical offensive plan. This will

be accomplished by sheer weight and concentration of massed tanks and IFVs. The overwhelming saturation of U.S. defensive positions with massive artillery concentrations, relentless direct fire, and selective massed air delivered concentrations will enhance the mobility, shock and agility of the breakthrough and is considered an essential prelude to armored and motorized rifle penetrations. Hitting the defensive zone either by surprise or sheer speed before extensive preparations can be undertaken is also considered an important ingredient to success. The Soviets expect to take heavy casualties.[7] Furthermore, the Soviets have also looked at possible weaknesses in their ability to conduct such operations. They regard effective tactical reconnaissance as an essential element in identifying and overcoming prepared defenses and unfamiliar terrain. The possible neutralization of this capability by U.S. forces is a cause of great concern for it will certainly curtail their speed and momentum, and force tactical-level commanders to deal with the unexpected. This emphasis on speed might also cause some units to launch attacks against U.S. defenses before they have been adequately neutralized by massive firepower. However, these potential weaknesses are considered minor in importance and capable of being overcome by events if the fundamental tactical tenets of the offense are rigidly adhered to.[8]

The Soviets consider the offensive to be the only way of achieving a decisive victory. Nevertheless, they will assume a defensive posture for fundamentally the same reasons as U.S. Army forces. Defenses are planned to be aggressive, stable and in tactical depth with well coordinated, concentrated indirect fire sacks, strong antitank fires and extensive

minefields. Mines are used primarily to slow and canalize enemy forces into killing zones of direct and indirect fires.[9] The element of surprise is an important function in defensive operations. Reverse slope defenses are used frequently to disguise the defensive framework from enemy observation.[10] Defenses are normally planned to be of short duration rather than deliberate in nature so as to allow a resumption of the offensive as soon as possible. Most defenses are emplaced at night to enhance security measures and deception.

For survivability, the Soviet Army intends to rely primarily upon speed, massive firepower and deception in the offensive stages of operation. The engineer emphasis here is on mobility enhancement. In defensive operations, survivability is achieved by a rapid digging-in of tanks, IFVs and personnel in platoon or company-sized strongpoints which are prepared for all-round defense and connected to the battalion's defensive plan by fire support and engineer obstacles. These battle positions have at least primary fighting positions for the maneuver vehicles and communications trenches linking critical crew served weapons positions and bunkers with command and control elements.[11] Unmanned and dummy positions will also be emplaced if time permits. The principal means of exercising survivability missions is by using the combat engineers.

Soviet combat engineers, unlike their U.S. Army counterparts, are integrated into the force structure at the regimental (U.S. Brigade) level as well as at the division and army (U.S. Corps) level. These combat engineers are equipped to provide a mobility, counterobstacle and countermine, gap crossing, route maintenance and survivability capability to

the supported maneuver forces. Their organic capability to prepare defensive positions is impressive. Given ideal conditions, a Soviet motorized rifle division can place all of its tanks in hull-defilade positions in just a little over one hour using organic engineer equipment.[12] The Soviet engineers intend to protect their maneuver forces so that they can transition into offensive operations quickly with a high percentage of their combat power intact. This concept is not new to the Soviet Army. The historical basis for their impressive modern day capability can be found in the lessons of the Great Patriotic War.

The Soviet Union entered World War II with fairly sound concepts on the employment of engineer forces in combat. Early combat experiences spurred the Supreme High Command in November 1941 to make changes in engineer organizations and streamline their force structure.[13] Divisional engineer battalions were slimmed down to a wartime TOE of 162 officers and men, and given the specific missions of obstacle breaching, supporting assault operations, laying and clearing mines, survivability support and limited route maintenance. The great majority of engineer forces were centrally managed at army and front level in Assault Sapper Brigades of approximately 2600 personnel. The operational-level commander had the flexibility of concentrating significant engineer support into critical sectors as it was required.[14] These brigades contained additional engineer battalions as well as bridging, mine warfare and flamethrower assets.[15]

Although the primary focus of Soviet engineers was offensive, defensive operations were also important. The Soviets came to view minefields as the most successful defensive obstacle and the key to survivability. On the

Eastern Front the Soviets hand buried nearly 220 million mines, nearly 25 times the number used by the U.S. Army in the European Theater of Operations.[16]

The principle Soviet wartime emphasis on survivability was on terrain denial, or countermobility in current parlance. In the defenses of Moscow and Stalingrad, the Soviets made extensive use of engineer-emplaced obstacles to protect the cities. Over 1200 kilometers of minefields, at a density of nearly 1400 mines per kilometer, were emplaced in front of Stalingrad.[17] These obstacles slowed, but did not stop, the Wehrmacht because most of them were not covered by fire.

Learning from their mistakes, the Battle of Kursk in 1943 tested and evaluated theories of defensive survivability that carried the Soviets through the 1940s and into the 1980s. A multi-echelon antitank defense consisting of more than 6000 kilometers of squad and platoon trenches, one million mines, and numerous antitank ditches and strong points were successfully integrated into a coordinated fire plan.[18] Tanks and artillery were well sited and dug in to enhance protected direct fire and facilitate a quick transition from the holes to massed local counterattacks.[19] Engineer Mobile Obstacle Detachments (POZ in Russian) assisted in these efforts.[20] The current Soviet doctrinal emphasis on survivability through the use of defensive obstacles (countermobility) followed by maneuver and offensive action can be traced back to Kursk.

The historical importance of engineer support to the maneuver arms continues to be considered critical to the combined arms battle of the 1980s. Soviet engineer work effort is more efficient now since the

acquisition of armored earthmoving vehicles which rapidly dig tank and artillery emplacements, small unit and communications trenches, and other protective shelters. Soviet engineers are now organic to maneuver units down to motorized rifle and tank regimental level (a company of 60 - 70 personnel organized for mine laying and counterobstacle missions). The divisional engineer battalion size has been increased to 395 in a tank or motorized rifle division, and is organized into an assault sapper company, a technical company, a road construction company, a pontoon bridge company and an assault crossing company. The assault sapper company of 65 men performs the same missions as its World War II counterpart. Earthmoving and survivability-oriented equipment (bulldozers and trenchers) are found in the road company.[21] The engineer focus is mobility first, followed by countermobility, and then survivability. The emphasis remains clearly offensive.

Nevertheless, the emphasis on protection is impressive. The amount of digging and survivability assets organic to the regimental and divisional engineer units is quite large and well-balanced. In a motorized rifle division, each of the 3 motorized rifle regiments and the tank regiment can have an "MDK" ditching machine that can emplace 12 tanks in one hour in reasonably well protected, if crude, hull defilade positions on terrain with soil conditions similar to those encountered over much of Western Europe. There are also 4 of these machines in the divisional engineer battalion. Together, they can dig in as many as 96 tanks in one hour. There are also tracked and armored "BAT" dozers (1 per regimental engineer company and 8 per the divisional engineer battalion), tank-attachable "BTU" dozer blades

(3 per regiment), and motorized "PZM" bucket excavators (also 3 per regiment) which are each capable of emplacing up to 3 hasty hull-down survivability positions per hour for tanks. Together, these items of equipment can dig in as many as 104 tanks per hour. Combined with the armored ditching machines, 204 of the 214 organic tanks in a motorized rifle division can be protected in just 60 minutes.[22] The Engineer Brigade at Combined Arms Army Level has 4 ditchers and 5 dozers organic to all of its three sapper battalions. Each of these battalions can provide up to 63 hull defilade tank positions per hour and are frequently allocated to division level in direct support roles.[23] Such organic capabilities do not exist in the U.S. Army at all.

Clearly, Soviet doctrine on the use of engineers for survivability missions fits the needs of their High Command. Engineer troop organizations are lean, well equipped and highly mobile, and capable of performing a wide variety of survivability, mobility and countermobility missions. They appear to be highly effective. Their orientation is offensive, but they possess the organic capability to get the combat systems of their maneuver forces to ground very quickly. The engineer assets are also tracked and armored to allow for mobility and maneuverability commensurate with their supported combat units. For the U.S. Army, the situation is not as well developed.

SECTION IV: THE AMERICAN PERSPECTIVE

The Soviet capability for large scale, intense warfare is undeniably impressive. AirLand Battle doctrine recognizes that the ability to synchronize superior combat power against such a numerically stronger enemy on a fluid and lethal battlefield will require a great deal of tactical acumen. Protection is a vital component of combat power.[24] Terrain architecture and protective construction are the aspects of tactical protection upon which combat engineers focus their primary attention. Sound survivability measures not only counter the effect of enemy firepower but facilitate the transition from protected defense to offensive maneuver. The engineer contribution to these survivability missions is considerable. However, its effectiveness may be a cause of concern.

The American experience in combat since 1941 has been quite different than the Soviets. Our wartime engineer experience and approach to battlefield survivability also differs from the Soviets. The 1943 edition of FM 5-6, Operations of Engineer Field Units notes that "the primary mission of the [combat] engineers in our Army is to increase the combat power of our forces by construction and destruction which facilitates the movement of friendly troops or impedes that of the enemy. Engineers give technical assistance to other arms in the construction of protective works...and camouflage."[25] In May 1945, the American Army had more than 688,000 engineers in uniform, comprising more than 8% of the Army force structure. In addition to the 89 divisional combat engineer battalions, there were 204 nondivisional engineer combat battalions, 36 construction

battalions, and 79 general service regiments. Front line engineers cleared and emplaced obstacles and minefields, kept roads open and built bridges.[26] In the European Theater of Operations, a division "slice" of engineers amounted to nearly 4 engineer battalions per division.

Survivability operations were not a major concern during the majority of World War II. The U.S. Army was never as desperately pressed as the Soviet Forces to resist a determined enemy and literally defend and fight for its very existence. Nevertheless, U.S. Forces often had to dig in and hold terrain until the offense could be regenerated. Construction of bunkers and trenches for personnel and communications centers provided the majority of survivability-related missions the combat engineers performed during the war in both theaters. A lot of the work was done by hand or with the limited amount of earthmoving and digging equipment in the 700-man battalions. This was slow work and was not responsive to the needs of the combat forces. After the war, the General Board recognized the need for more digging capability in the engineer battalion and recommended an increase in earthmoving assets by at least 2 or 3 fold.[27]

Survivability support during the Korean War centered upon the construction of bunkers and fighting positions for dismounted personnel. Because of the rugged terrain, the overwhelming amount of engineer support in the theater of operations went towards constructing roads, bridges and facilities. Due to the nature of the terrain and the enemy, countermobility operations focused upon antipersonnel mine warfare and wire obstacles. There was little danger of large scale armored penetrations or much need to protect tanks from direct fire weapons systems. The Vietnam experience was similar.

The terrain prevented large scale armored maneuvering. The principle threat to tanks and artillery was from enemy personnel who could get close enough to fire mortars or rockets at them. Protective positions were usually above ground sandbag and earth revetments. The great majority of engineer effort was spent upon land clearing and constructing roads, bases and facilities.

Most of the recent American combat engineer experience has not been in higher intensity, mobile warfare. The AirLand battlefield will place demands upon the engineers that they are not well prepared for. While many engineer missions have remained fairly predictable and traditional, what has changed is the sheer scope and speed with which they must be accomplished.[28] Engineers have not kept pace with the technological developments in accuracy and speed of modern weapons systems or their need for protection. Given a generous amount of time and resources, conventional combat engineers can perform the survivability missions now required of them. But a surplus of time is unlikely and unreasonable to hope for on the AirLand Battlefield.[29] What then, should be the survivability focus for engineer support in defensive operations?

One mechanism for testing and evaluating this is the U.S. Army National Training Center (NTC) at Fort Irwin, California. The NTC is designed to test U.S. Army heavy division maneuver battalions and task forces in the most realistic AirLand battle training environment in the world. The center simulates as closely as possible the expected intensity and confusion of land combat against the forces of our most dangerous opponent. A dedicated Soviet-styled maneuver force called the Opposing Force (OPFOR) "fights" American units using the doctrines and techniques of the Soviet Army. Kills

are verified using a computer and laser-simulated direct fire mechanism known as the Multiple Integrated Laser Engagement System (MILES). The opposing U.S. Army forces learn from practical experience which tactics and courses of action are sound and which are unlikely to be successful.

The NTC reinforces the fact that it is not possible to be strong everywhere across a wide front, especially the desert. Piecemealing the defense by spreading it out across a broad front invariably leads to the defeat of the U.S. force by the OPFOR. Soviet offensive tactics are designed to isolate and penetrate a portion of the friendly defense and simply blow through it using the effects of mass, firepower and momentum. Typically, the NTC battles have shown that attacking OPFOR formations using these tactics invariably expose some of their flanks and rear to the defenders. When the U.S. task force can slow the attacker down and disengage enough to get firepower on the flanks, the attacker can be thrown off his axis and stopped. The ability to conduct such tactics is dependent upon maneuver; specifically, by preparing, marking and rehearsing the movement into and out of battle positions. Survivability of the task forces' combat power during the initial stages of the attack is what allows these bold and successful operations to take place.[30]

The more successful defenses do not always attempt heavy direct fire attrition of the attacker at extended ranges.[31] Such tactics tend to allow more freedom of maneuver to the attacker. Often, the best position to open the battle tends to occur at closer range (less than 1500 meters) from a thick, high volume of fire from quality, protected positions sited to shoot from multiple directions. Reverse slope defenses are usually more

successful than forward slope because they achieve greater surprise. A defense in depth is essential. Linear deployments invariably lose. These high risk - high payoff defenses are successful when sufficient effort by combat engineers to emplace protected fighting positions for the tanks and IFVs is directed by the task force commander.[32]

Survivability with regard to combat vehicle positioning involves several factors. Correct vehicle siting allows tanks and TOWs to both survive and kill. Hull defilade positions, while certainly effective in the majority of situations, can still be acquired and subsequently targeted by the modern Soviet forces. Full hide positions make it possible to stay undetected and protected until enemy vehicles are in the area where it is planned to kill them. Positions to the flank of an enemy approach and behind frontal cover are also far less detectable by an advancing enemy and therefore more effective.[33]

Tests at NTC have demonstrated that a properly dug in tank platoon can take out an attacking enemy battalion using defenses that incorporate these techniques. Even positions in the open, on the valley floor of the desert, are often very successful. These positions, having well-sited vehicle locations with covered routes to full defilade, allow grazing fire similar to that of a machine gun in an emplacement.[34] Units which were adequately dug in and protected not only survived surprisingly well but were usually able to come out of their holes and finish off their attackers with little attrition to themselves. A distance of about 75 meters between primary and alternate positions increases survivability and reduces the possibility of enemy suppression.[35] Finally, several years of experience and analysis of

lessons learned at the NTC have demonstrated that a high volume of protected fire is needed to blunt the attack. Employing a "rock and roll" technique of repetitively moving in and out of firing positions helps the attacking OPFOR forces to target and kill defending tanks. The best way of achieving this volume of fire is to stay in position and pour on the firepower. Using engineer obstacles to slow the enemy rate of advance and help create killing pockets is an additional enhancement to the U.S. defender.[36]

Maneuver task forces normally deploy to the NTC with their habitually associated slice of combat support assets, including one or two platoons of engineers from their parent brigade's direct support divisional engineer company. The task force commander must plan their use effectively to get the greatest benefit from their many capabilities. Mobility operations are certainly important in the movement to contact and offensive stages, and countermobility operations are valuable in slowing the enemy and shaping the battlefield. Artillery-delivered FASCAM has done a lot in saving engineer resources for employment elsewhere in other missions. But the NTC experiences make a very strong case for survivability. If the friendly force does not withstand the artillery fire barrage, it cannot secure the advantage the minefields and obstacles present it, or be able to transition into an offensive posture to counterattack and destroy the enemy. Protection is, therefore, critical to both defensive and offensive operations.

Unfortunately, the engineer units deploying to NTC are frequently not up to the tasks required of them by the maneuver commanders. One common problem is a lack of joint training between the engineer elements and the maneuver

task force at home station before the NTC rotation. This is easily correctable. The more serious problem is systemic: the lack of survivability-related capability organic to the deploying engineer element. There is only a finite amount of engineer digging capability available in a divisional engineer company or one of its line platoons. A J-series TOE for the divisional combat engineer battalion includes 6 M9 ACEs in each engineer company. These items replace the 2 authorized WWII-vintage D7 bulldozers, which were dependent upon tractor trailer transport for all but jobsite movement. Because most stateside units have not yet received the ACE, task forces deploying to the NTC normally had their supporting engineer platoon bring both bulldozers, the entire engineer company's TOE authorization.

The J-series TOE when implemented will allow each engineer platoon in the company to task organize with at least 2 M9s.[37] These 2 M9s can each dig hull defilade tank positions at the rate of approximately one per every [illegible] hours, depending upon soil conditions.[38] The production time for the more desirable turret defilade positions is approximately 2 hours each.[39] The [illegible] tanks of an M1 armor battalion can therefore be dug in to hull defilade with the assets of one supporting divisional engineer platoon in about [illegible] hours. If the task force is fortunate enough to have additional engineer assets (a second platoon) attached from the parent brigade's supporting engineer company the battalion could reasonably expect to have all its tanks dug in and protected in one hull down position in about 13 hours, assuming these digging assets do nothing else. The 348 tanks of an armored division (6 armor battalions) can be protected and dug in using the organic [illegible] M9 ACEs of the divisional engineer battalion in 12.5 hours. The

corps normally allocates at least one or more corps combat engineer battalion to each deployed division in the combat zone. These corps battalions are more streamlined than their divisional counterparts and include 14 ACEs in their TOE.[40] Two additional corps engineer battalions, augmenting the divisional engineer battalion, making a total of 3 committed engineer battalions to a single division, could reduce the completion rate for tank hull defilade positions to 6 hours. Note that this figure does not include artillery, IFV, ADA, or command and control survivability positions.

Compare this with the scant 1.5 hours it takes the single organic Soviet divisional engineer battalion to dig in all its division's tanks. The Soviets can emplace primary, secondary, and selected supplemental positions for all their tanks and most of their artillery, infantry, ADA and command and control systems using organic assets in the same time a U.S. heavy division, augmented with corps assets, can dig just primary positions for only its tanks. The Soviets clearly consider the survivability issue more critical to the effectiveness of their forces than does the U.S. Army. The severity of this imbalance is even more evident in light of the already existing numerical superiority the Soviets possess in offensive oriented direct and indirect fire weapons systems. The U.S. Army is unmistakably at a serious disadvantage in survivability potential on the AirLand battlefield. The U.S. combat engineer battalion is less capable, adequate or responsive than its Soviet counterpart. What should be and is being done about this and is it enough?

SECTION V: ANALYSIS

The Soviet Army has a measurable quantitative edge in battlefield survivability over the U.S. Army. The U.S. combat engineer battalion, both divisional and corps varieties, does not have the organic capability to construct fighting and protective positions rapidly in the quantity or the time required to ensure the survivability of a combat division. This need for protection is not unrealistic or overly ambitious. Engineer capabilities just do not match the present or future doctrinal requirements.

Protecting against enemy artillery demonstrates this weakness. The Soviets view integrated fire support as a decisive element on the battlefield. Against our defenses, it will be the principal means of achieving a favorable force advantage in critical sectors. Massed artillery will be used to blast holes through defensive lines through which concentrated armor and motorized rifle formations will pour.[41]

In the sector of a Soviet Combined Arms Army (CAA) attack, the division conducting the main attack could expect to have as many as 16 battalions of tube artillery supporting it.[42] These battalions would come from its organic combat regiments (4), the divisional artillery regiment (3), CAA and front artillery brigades (5), and the second echelon division artillery (4), for a total of 288 tubes supporting a 15 - 20 kilometer wide division front. In addition, the normal divisional complement of 54 120mm mortars and 18 122mm 40-tube multiple rocket launchers (MRLs) can be brought to bear to achieve a density of more than 60 - 100 tubes per kilometer of frontage along the main axis of attack.[43] The Soviets have calculated firing norms

for their artillery to achieve either suppression (non-mission capable damage) or destruction (50% obliteration) of the enemy defender. For example, to suppress a company team of entrenched troops and fighting vehicles in hasty fighting positions within a 700x200 meter battle position, Soviet artillery tables call for an expenditure of 2100 rounds of 122mm howitzer ammunition, an average of 150 rounds per 100 square meters.[44] In the sector of a Soviet divisional main attack, the 360 tubes of artillery, mortars and MRL firing at a sustained rate of 3 rounds per minute throughout a 20 minute fire assault would send 21,600 rounds of high explosive down onto the U.S. defenders. Against such devastating and withering indirect fire, digging in is an absolute requirement, not an option.[45] The Soviet artillery threat is so great that the failure to protect the combat force will result in its inability to survive the assault and stop the enemy.

The NTC is not capable of portraying realistically the stunning and destructive effect of a Soviet fire assault. However, it is an excellent simulation of direct fire force on force. Here, too, the necessity of providing adequate survivability measures is demonstrated. Forces that can survive the initial weight of enemy fire are able to maneuver decisively and bring effective firepower to bear. The type of defensive operation being conducted helps indicate the priority that should be given to survivability efforts. In a delay where space is being traded for time, engineer obstacles are as important as survivability to slow the enemy long enough to allow the repositioning of friendly forces. With missions such as defend in sector, defend a battle position, or defend a strong point, survivability

becomes the over-riding priority for the defender.[46] Obstacles are important in shaping the battlefield and denying the enemy access to an area. But protection is what allows the force to continue its mission.

As noted earlier, survivability as a concept combines positions, tactics, camouflage and deception operations. For the AirLand battle, construction of fighting positions (for vehicles, weapons and soldiers) and the emplacement of protective positions (for command and control centers, logistics centers and support facilities) are the principle survivability contributions of the combat engineers. At the NTC, given realistic time constraints and mission demands, a U.S. unit never has the time or resources to protect itself as fully as it would like. The ideal defense would have turret defilade primary, alternate and supplementary positions for every fighting vehicle, as well as dug-in individual and crew-served weapons fighting positions, communication trenches, emplacements for tube and air defense artillery systems, and protected shelters for command and control and logistics centers.[47] Normally, only primary positions and limited secondary positions for selected fighting vehicles are emplaced. Individual and crew-served weapons positions are frequently constructed for dismounted personnel, but only very rarely usi eer assets. A balanced mech-armored task force requires abc .00 vehicular positions: two each for tanks and ITVs and one each for Vs, command and control, combat support, fire support, and service su ort elements.[48] As shown earlier, this equates to more than 180 uninterrupted blade hours for the engineer equipment. For the task force to perform this requirement in 24 hours, 8 of the entire division's 25 M9 ACEs would be required. Clearly, this is not

acceptable. Speed in digging in is crucial. Otherwise, with the tempo of the modern battlefield, the bulk of a division's combat forces will be little better off than if they were caught out in the open.[49]

The NTC demonstrates the importance of focusing the limited engineer effort, particularly with regard to digging assets. A task force or maneuver battalion is forced to designate the most critical assets it wants protected and then supervise the siting and construction of the positions. Vehicular fighting positions and associated route clearance to them tends to consume virtually all the engineer digging time and equipment available to the task force. Obstacles such as tank ditches, which have been proven historically useful in many wars during this century, tend not to be regarded highly at the NTC for defensive purposes. This is because they are engineer time and labor intensive and the limited digging assets are required for fighting position defenses. If additional or speedier digging capabilities existed in the engineer battalion, tank ditch construction might again be a useful defensive technique.

Also an issue is the need for providing protective positions for dismounted personnel, artillery and air defense systems, command and control centers, and service support functions. Invariably, time and equipment limitations deny a task force at the NTC the opportunity to provide this protection with engineers. These vital elements frequently suffer the effects of enemy indirect fire and damage from air attack. Desirably, the mechanical systems would be provided the same degree of protection as the combat vehicles. In addition, the full effect of artillery on dismounted soldiers, even in foxholes, is difficult to simulate at the NTC even with

MILES equipment and controller personnel. Regardless, the potentially shattering effect of an enemy fire barrage on elements of a task force not buttoned up in armored vehicles cannot be ignored. The limited number of dismounted infantry foot soldiers will commonly be actively involved in patrolling, reconnaissance and screening activities. Their chief danger will come more from enemy small arms and mortars than from artillery or aerial delivered munitions. However, the larger percentage of command and control, fire support and service support personnel will be highly vulnerable to threat fires. To rectify this many units training at the NTC have preconfigured standard packages for engineer-related Class IV barrier materials with which to construct protective shelters with overhead cover without the help of engineers. The effort of this direction is sound. Units can benefit from portable, reusable equipment and supplies that they can carry to combat with them and use to protect their dismounted forces. Nevertheless, these survivability activities will take time and resources that could be spent elsewhere in mission-related activities. The same time constraints exist for individual survivability activities as for vehicular protective measures. Large scale, complex protective shelters and bunkers will not become a priority on the AirLand battlefield. The tempo of combat will be too fluid and rapid to allow their construction. Units need the capability to dig themselves in very quickly, survive an attack, and transition back into an offensive posture to destroy the attacker. Therefore, the engineer survivability capability most needed is one giving rapid and temporary protection for the force.

The shortfall in this capability is considerable. It is obvious that

the existing combat engineer force cannot achieve the survivability requirements of ground forces on the AirLand battlefield. Organizational and equipment improvements are warranted. Before examining these, it will be useful to consider alternatives to digging that are complementary to the concept of survivability for the combat force.

One method of complementing survivability is by emphasizing engineer obstacle construction that denies the enemy his mobility and facilitates friendly movement. Barriers serve to divert the enemy from his planned route, disperse his mass, and delay him so that effective fire can be brought to bear. However, obstacles such as minefields, tank ditches and road craters tend to have the same effect on both sides, and if employed indiscriminantly can cancel out possible friendly maneuver options. They also tend to be persistent, and have effects which last longer than those of direct or indirect fires. They must be bypassed or physically overcome.[50] To be most effective, obstacles need to support the friendly scheme of maneuver and be emplaced quickly.

One technique is to designate obstacle zones where the available engineer effort can be focused on major avenues of approach and areas of interest. Within these zones, which are in effect non-maneuver zones, maneuver commanders can direct their engineers in the emplacement of obstacle belts to reinforce terrain and support fire concentrations.[51] By prioritizing the engineer work, effective utilization of engineers is maximized. Often neglected obstacle reporting and recording procedures are also simplified. Except for tank ditches, obstacle zone construction is advantageous in that it requires different assets than the earthmoving needs

of survivability. A few subtle obstacles which allow relatively easy bypass can also help channelize an attacker into designated fire sacks. Obstacle systems do possess disadvantages relative to survivability. They, too, are time and labor intensive, and do not act to shield the friendly force against enemy direct or indirect fire.

Another countermobility asset is artillery and air delivered scatterable mines (FASCAM). FASCAM can enhance survivability because it can be emplaced very quickly - even right on top of an attacking enemy - such that the defending force can bring its firepower to bear or maneuver to more advantageous positions. A variety of FASCAM products can be emplaced using tube and rocket artillery, and both rotary and fixed wing aviation assets. This capability makes FASCAM the most potentially useful and valuable countermobility asset in the Army inventory. It also represents the principle focus of attention in the engineer community regarding countermobility research and development. FASCAM can act as a combat multiplier because of its versatility and lethality. It is and will continue to be a capability much in demand on the AirLand battlefield. However, regarding force survivability, it is much like any other more conventional obstacle. It is for naught if the defending force cannot resist an attacker's firepower.

Deception also enhances survivability. Well camouflaged and sited positions using a reverse slope defense have been proven at the NTC to be very effective against a Soviet style attack. A reverse slope defense, in addition to masking the true location and disposition of the defender, tends to help reduce the effect of an artillery barrage which cannot be

concentrated and brought to bear against a point of known weaknesses. When augmented by dummy positions credibly sited so as to be observable to the enemy, the defender can draw off much of the effect of enemy firepower and help cause the enemy to play into a well designed trap.[52] Even so, the need for well constructed survivability positions in depth is essential for such techniques to be successful.

Another consideration currently being examined is to develop and field preconfigured, palletized unit loads of barrier, obstacle, and explosive materials and tools into standardized countermobility and survivability sets available for the total force. These standard unit packages could be ordered, stocked, and delivered to field units for such diverse requirements as finite length minefields, point obstacles, crew-served weapons shelters and overhead cover for 2-man fighting positions. Several sets could be combined to make longer obstacles or strong point positions. The advantages of this proposal would be the relative simplicity of requesting, distributing, and transporting these generic sets from supply bases to the front line forces. The chief disadvantages would be wastage of items not required for every obstacle or position and the sheer cost of creating and stocking these packages. Also, the priority for transportation assets will be for subsistence, fuels and ammunition. In addition, the applicability of this proposal to survivability on the AirLand battlefield, while valid, is not as urgent as the need for a better capability to dig in quickly.

A promising organizational revision of combat engineer force structure is E-Force. This initiative is designed to provide more engineer capability into divisions without increasing the actual current engineer spaces in the

Army. In the active army today, almost 75 percent of all engineers are in corps units. In a mature (reinforced) theater, a heavy division can doctrinally expect to be supported by two to three corps combat engineer battalions and support companies. A committed task force would then expect to have a company equivalent of engineers in its sector rather than the one platoon which most units have been accustomed to.[53] By realigning corps and divisional battalions, a separate engineer group of 3 smaller battalions could be created in the division structure to operate in a relationship much like the DIVARTY, with one battalion supporting each brigade. This would allow a more rational task organization within the division and better command and control of engineer assets.[54] It would also ensure that a larger amount of engineer forces would be immediately available in a short-notice scenario or in support of an undeveloped theater. The disadvantage of E-Force is that it requires additional senior personnel positions to implement. However, E-Force is an economical proposal with respect to equipment utilization. The principle advantage it would give the heavy division with regard to survivability is an increase from 2 to 6 M9 ACEs supporting each task force. This would allow a balanced task force to completely dig in its 28 tanks in about 4.5 hours.[55] Compared with the scant 1.5 hours a Soviet division needs to dig in all its tanks, however, E-Force is not the final remedy for the U.S. Army's survivability ills.

Given these alternatives and considerations, what should be done with the combat engineers to ensure the survivability of the combat force? The basic doctrine is satisfactory, but the capabilities of the combat engineers are deficient. The focus on sustaining a force's survivability so that it

can regenerate and apply combat power is clearly in line with AirLand battle doctrine. Commanders will always have to make trade-offs with engineer assets to support competing mobility, countermobility, and survivability missions.[56] This will not change regardless of the size of the engineer force. However, the Soviet engineer battalion (including the regimental engineer companies) is less than half the size of its American counterpart, yet it is efficiently organized and responsive to the needs of the supported combat forces. This is the difference between the engineer battalions of the two forces. The Soviet capability to conduct survivability missions is at least 3 times greater than that of the U.S. heavy division combat engineer battalion in terms of speed and productivity. E-Force would mean an improvement in engineer responsiveness and direct support capability. Again, though, it is not the complete answer to the survivability problem.

Newer and better equipment is needed. A high speed excavator to augment the versatile M9 is a logical requirement. We need a mobile, armored, survivable digging machine that can create hull defilade fighting positions in 5 to 10 minutes or less. This is a capability the U.S. Army has never possessed, but one that the Soviets have successfully developed and fielded.[57] Such a system would also be advantageous in that it could much more rapidly and efficiently emplace tank ditches and thus enhance countermobility operations as well. The use of preconfigured and palletized unit loads for engineer-related Class IV and Class V barrier and obstacle materials may also be a step in a positive direction if these can be kept simple and logistically supportable. Otherwise, they will amount to nothing better than unwanted battlefield clutter. The cost effectiveness of such

proposals will prove to be their principal drawback.

Finally, it must be recognized that the best approach to tactical survivability on the AirLand battlefield is the one which provides the combat force the ability to transition quickly from a defensive posture to an offensive orientation. The focus of the combat engineers should be in this direction.

SECTION VI: ASSESSMENT

The danger of thinking in terms of survivability is the tendency to become defensive minded and rooted to terrain. AirLand battle doctrine is designed for modern, high-tempo warfare. It is offensively oriented and reflects the recognition that one cannot win by defending alone. Of the many facets of protection both addressed and excluded in this discussion, tactical survivability is most important because its measures are what allows a force to resist and recover from a fierce onslaught of fire and to move against an attacker and destroy him. Survivability requirements are consistently underestimated. Units will not only have to survive the first attack, but many subsequent attacks. Survivability measures must therefore be rapid and responsive to the needs of the close combat forces wherever and whenever on the battlefield they occur.

Elaborate, dense belts of obstacles and strongly fortified defensive positions are not conducive to fighting on the AirLand battlefield after the initial clash of arms. Forces will not remain in place long enough to

use such procedures. Historically, such defenses can be overcome relatively quickly. The Soviets have a formidable capability to neutralize the effects of obstacles and cut deep into a defender's territory using massed armor and air assault forces. To win, we must carry the fight to the enemy. This cannot be accomplished with a defensive, positionally-oriented mind-set. Offensive action wins the AirLand battle. Measures such as camouflage and deception are important in achieving a greater measure of protection for the force, but the ability to rapidly dig in as many times as needed and only for as long as necessary is the best protection a tactical force can have.

There is already an increased awareness of survivability concepts in doctrine and in training. Tactics such as reverse slope defenses and unit battle positions are reflective of this. Doctrinal manuals like FM 5-103, Survivability, provide excellent examples of protective measures a force can employ. But historically, U.S. forces have never been ready for the first battle. The lack of an effective capability for survivability places the heavy division in a position of jeopardy. There remains today too great a tendency to think in terms of material and labor intensive positional defenses that require great quantities of construction materials and explosives. Soviet doctrine and the NTC experiences have shown that such measures are unlikely to be successful on the AirLand battlefield. The time will simply not be available for such endeavors and the supply system will not be able to sustain the demand for construction and barrier materials repetitively. Lumber and sandbags will not take priority over tank and artillery ammunition in the combat zone.

Countermobility alternatives to survivability do not answer the need,

[illegible]. FASCAM is a valuable and much needed combat multiplier for AirLand [illegible]. But it is difficult if not impossible to tailor a battlefield so [illegible] with obstacles that the enemy will go the way we want him to. [illegible] is vital to winning on the high-tech battlefield, and maneuver unit [illegible] do not want the battleground dirtied up with a dense web of [illegible] and minefields that act to restrict friendly maneuver as much as [illegible] the enemy. A maneuver philosophy requires an offensive outlook. [illegible] must be moved rapidly and positioned decisively. They must survive a [illegible] threat fires repeatedly. Survivability is a direct function of [illegible] and mobility.

[illegible] must contribute positively to these requirements. The [illegible] organization and equipment of combat engineer battalions do not [illegible] responsive, essential force survivability. The ongoing fielding of [illegible] is a positive step in improving capabilities in many mission [illegible] survivability. This needed improvement should be [illegible]-Force initiative, if approved, may also improve combat [illegible], responsiveness, and command and control. It would [illegible] equipment to the divisional engineer force which would [illegible]. However, these organizational proposals and [illegible] do not provide a complete answer to the survivability [illegible] engineers must further upgrade their physical capability to [illegible]. A high speed excavator with a capability similar to that [illegible] Soviet equipment is the best practical solution to the tactical [illegible]. It must be made an item of high priority for [illegible] testing. The protection of the entire ground force can be

better assured with this capability.

Survivability is a vital component of success on the modern battleground. It is what allows combat forces to persist and endure. Although intrinsically and intuitively a defensive component of combat power, it is an essential element of successful offensive action. The U.S. Army is currently deficient in this capability. This must change if our forces are to survive on the AirLand battlefield. The combat engineer must be charged as the agent for its improvement.

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